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(54) Title: A WATER TREATMENT CARTRIDGE FOR USE IN DOMESTIC WATER TREATMENT APPARATUS AND DOMESTIC WATER TREATMENT APPARATUS INCLUDING SUCH A CARTRIDGE		
(57) Abstract A replacement water treatment cartridge for a domestic water filter jug comprising a cup-shaped receptacle (21A) containing water treatment medium (26A) and fitted with a removable water impervious membrane (35A, 36A) which covers both the open top of the receptacle (21A) and an outlet (24A) in the bottom of the receptacle (21A). The exterior of the receptacle (21A) has a spiral groove (37) formed in a neck portion (38) thereof near its brim, and a peripheral flange (19A) at the lower end of that neck portion (38). The membranes (35A and 36A) are fitted for storage to retain moisture within the water treatment medium contained within the receptacle (21A). When the cartridge is to be installed, the membranes (35A and 36A) are removed and the cartridge is screwed into a respective opening in the base of a hopper, the peripheral flange (19A) forming a watertight seal with structure of the hopper.		

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A WATER TREATMENT CARTRIDGE FOR USE IN DOMESTIC WATER TREATMENT APPARATUS AND
DOMESTIC WATER TREATMENT APPARATUS INCLUDING SUCH A CARTRIDGE

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This invention relates to a water treatment cartridge for use in domestic water treatment apparatus such as a water filter jug, to apparatus for carrying such a water treatment cartridge in a receptacle and to domestic water treatment apparatus, in particular, a water filter jug for fitting with such a water treatment cartridge.

Water filter jugs usually comprise a removable hopper which is supported on the brim of the deep vessel that is formed by the jug. The hopper is adapted to carry a water filter cartridge which typically comprises a moulded container having inlet and outlet slots formed therein to allow water to enter and exit an internal cavity which contains water treatment medium.

In use, the cartridge is located in the hopper so that the inlet slots open into a chamber formed by the interior of the hopper and the outlet slots open into the vessel below the hopper. Hence when unfiltered water is poured into the hopper, it flows through the cartridge where it is purified and then out from the cartridge into the vessel. The cartridge and the water treatment medium are such as to ensure that the dwell time of water in the cartridge is sufficient to provide adequate purification.

The water treatment medium used in such cartridges typically comprises a particulate filter and may also include granules of an adsorbent material such as activated carbon. During processing of the water treatment medium, moisture is introduced. This moisture assists the effective performance of the water filtration and purification. Hence it is important that during storage of the cartridge, the water treatment medium is not allowed to dry out. However, a problem with known cartridges is that the inlet and the outlet slots allow moisture to escape from the

cartridge during storage thereby reducing the effectiveness of the water treatment medium. A known solution to this problem is to package water treatment cartridges for sale in sealed plastic bags. However, this increases the
5 overall cost of producing the cartridge.

According to one aspect of this invention there is provided a water treatment cartridge for use in domestic water treatment apparatus such as a water filter jug, the cartridge being as claimed in claim 1.

10 Preferred features of the water filter cartridge are claimed in claims 2 to 7.

According to another aspect of this invention there is provided domestic water treatment apparatus, in particular, a water filter jug, fitted with a water treatment cartridge
15 according to said one aspect of this invention wherein the removable covering means of the cartridge have been removed.

The provision of a reticulated screen, typically a mesh, to cover openings in a water filter cartridge, forms
20 the subject of International Application No. GB 97/02120 filed 6 August 1997 by Brita Water Filter Systems Limited. The mesh may be made from filaments of metal or a suitable plastic material and may have an interstice size in the range 50 micrometers - 300 micrometers, preferably 80
25 micrometers to 200 micrometers.

An advantage of the water filter cartridge of the present invention is that the water treatment medium is maintained in a moist condition until required for use, without the need for costly and bulky packaging.

30 Two forms of water filter cartridge and a hopper for a water filter jug, in which the present invention is embodied will be described now by way of example only, with reference to the accompanying drawings, of which:-

Figure 1 is a transverse cross section of a water
35 filter jug with a hopper fitted therein and supporting a water filter cartridge, the hopper and the cartridge being shown in elevation apart from the part of the hopper that

supports the cartridge which is cut away to reveal the lid of the cartridge and which is shown in section;

Figure 2 is a view of the lid of the cartridge and of the surrounding portion of the hopper as seen on arrow A on
5 Figure 1;

Figure 3 is a section on line III-III in Figure 2;

Figure 4 is a view similar to Figure 3 showing the opening at the base of a hopper adapted to receive another form of water filter cartridge; and

10 Figure 5 is a partly section side elevation of the water filter cartridge to be fitted into the hopper opening shown in Figure 4 in condition for storage.

Figure 1 shows a water filter jug 10 which has a hopper 11 fitted into it. The hopper 11 is generally
15 cup-shaped, having a cylindrical side wall 12, a base 13 and an outwardly-extending peripheral flange 14 formed around its brim. The hopper 11 is supported within the interior of the deep vessel formed by the water jug 10 by having its peripheral flange 14 seated upon the brim of
20 that vessel. The base 13 of the hopper 11 slopes radially-inwardly, away from the flange 14 and to an opening 15 at its center. The opening 15 is formed by a tubular portion 16 which is integral with and which extends from the base portion 13 away from the flange 14. The end of the tubular
25 portion 16 remote from the flange 14 forms a radially-inwardly directed flange 17. A spiral groove 18 is formed in the bore of the tubular portion 16 between the base portion 13 and the inwardly directed flange 17.

The flange 17 provides an annular seat for a radially-
30 outwardly extended peripheral flange 19 which is formed around the brim of a cup-shaped receptacle 21. The receptacle 21 has a side-wall 22 which tapers to a base 23. Figure 3 shows the base 23 has an opening 24 formed in it and the opening 24 is covered by a reticulated screen 25,
35 such as a mesh.

The receptacle 21 contains water treatment medium 26. The upper end of the receptacle 21 is open and serves as

the inlet of the receptacle 21. The opening 24 serves as the outlet of receptacle 21. When so installed, the receptacle 21 with water treatment medium 26 contained therein serves as a water filter cartridge but its open mouth, or inlet, is covered by a screen member 27 which is screwed into the bore of the tubular portion 16 and which traps the peripheral flange 19 of the receptacle 21 on its annular seat formed by the flange 17.

The screen member 27 has the form of an upturned cup, comprising a crown portion 28 and a depending skirt portion 29. Each of the crown and skirt portions 28 and 29 has a series of slots 30 through it. The slots 30 are covered by mesh 31. A radially-outwardly projecting annular flange 32 is formed integrally with the skirt portion 29 and is spaced from the brim of the cup-shaped screen member 27 by an appropriate distance such that it seats in a corresponding annular shoulder 33 formed at the upper end of the tubular portion 16 of the hopper 11 when that brim seats upon the peripheral flange 19 as shown in Figure 3. The external screw thread that engages with the spiral groove 18 is formed on the external surface of the skirt portion 29 between the annular flange 32 and brim of the cup shaped screen member 27.

The seating of the annular flange 32 in the annular shoulder 33, of the peripheral flange 19 on the annular flange 17 and of the brim of the cup shaped screen member 27 on the peripheral flange 19 ensures that a substantially water-tight seal is established between the interior of the cartridge formed by the receptacle 21 and the interior of the cup shaped skirt portion 29 on the one hand and the interiors of the hopper 11 and the vessel below the hopper 11 on the other hand.

Prongs 34 depend from the structure of the screen member 27 and project into the interior of the receptacle 21 through the open mouth that forms its inlet.

Replacement of the water treatment medium 26, when the need arises, is a simple matter. The screen member 27 is

unscrewed and removed. The receptacle 21 is then lifted up through the bore of the tubular portion 16. A replacement cartridge is inserted in its place and the screen member 27 screwed back in place.

5 By this invention, for storage purposes, the mouth formed by the upper end of the cup-shaped receptacle 21 and the opening 24 in the base 23 thereof are each covered by a removable cover 35, 36 which is a removable membrane formed for example of foil or plastic. The membrane 35, 36 is
10 sealed to the receptacle 21 so that, during storage of the cartridge, moisture is retained within the water treatment medium 26 contained therein. Conveniently each removable cover 35, 36 has a portion by which it can be readily grasped by fingers so as to facilitate its removal when
15 the cartridge is required for use. However, provision of the prongs 34 in the screen member 27 avoids the need to remove the cover 35 from the mouth of the receptacle 21 before installation. This is because, as is illustrated in Figure 3, the prongs 34 pierce the membrane 35 in the act
20 of screwing the screen member 27 into position to trap the peripheral flange 19 on its annular seat. For convenience the membrane 36 is shown chain dotted in Figure 3 in the position in which it covers the outlet opening 24.

Any form of cover can be used provided that when it is
25 fitted over the inlet and/or outlet of the receptacle 21 of the cartridge, it is able to prevent moisture from escaping from the water treatment medium contained in the cartridge and that it can be selectively opened for use when required. For example the cover may be a "clip on" member.
30 Such a "clip on" member could be adapted to be refitted to the cartridge after use. This is particularly advantageous when the water treatment medium is to be recycled as such refitting of the "clip on" member facilitates storage of the used water treatment medium in the cartridge until
35 recycling thereof. A further advantage is that, when the cartridge is extracted with the "clip on" member refitted thereto, spillage of the water treatment is avoided.

The means of installing a cartridge which embodies the present invention is not limited to fitting into a removable hopper of a water filter jug as described above with reference to Figures 1 to 3. A form of water filter jug in which the interior of the deep vessel formed by the jug is divided into two compartments by a wall extending across that interior, part way down has been proposed, and the form of installation described above with reference to Figures 1 to 3 would be for suitable use in such an arrangement because the replacement cartridge is installed from above.

Another form of cartridge in which the present invention is embodied is designed for screwing from below into a tubular portion which forms the opening in the base of the hopper. Figure 4 illustrates such an installation and Figure 5 illustrates a replacement cartridge for fitting therein. Parts of the installation shown in Figure 4 and of the cartridge shown in Figure 5 that are similar to corresponding parts of the installation described above with reference to and illustrated in Figures 1 to 3 are given the same reference characters but with suffix A.

The peripheral flange 19A of the receptacle 21A is formed at a location in the side wall 22A that is spaced from the brim of the cup shaped receptacle 21A. A spiral groove 37 is formed in the outer surface of that portion of the side wall 22A that forms a neck portion 38 and that extends between the brim of the receptacle 21A and the peripheral flange 19A. The bore of the tubular portion 16A that forms the opening 15A in the base 13A of the hopper 11A, forms a screw thread which inter-engages with the spiral groove 37.

Figure 5 shows the receptacle 21A fitted with removable covering membranes 35A and 36A. In order to install the replacement cartridge 21A, the covering membranes 35A and 36A are peeled off by engagement with fingers of the portions for that purpose and the neck portion 38 is screwed into the bore of the tubular portion

16A until the peripheral flange 19A engages the lower end thereof to make a water tight seal.

An inverted cup-shaped screen member 27A extends over the inlet of the cartridge that is formed by the open mouth at the upper end of the receptacle 21A. This screen member 27A is similar to that described above with reference to Figures 1 to 3 but does not include that part of the skirt portion 29 that depends below the annular flange 32. The annular flange 32A of the screen member 27A seats in the respective annular shoulder 33A to form a water tight seal.

The aperture size of the meshes 25 and 31 is sufficient to allow water to flow therethrough whilst at the same time being smaller than the particles of the water treatment medium 26 so that, in use, escape of those particles from within the receptacle 21, 21A is inhibited. Usually an interstitial diameter of about 50 micrometers - 300 micrometers is selected, preferably in the range of 80 micrometers - 200 micrometers.

As an alternative to the use of apertures which are covered by reticulated screens such as meshes, narrow slots could be used, the width of the slots being less than the size of the particles so that the slots inhibit passage of the particles through them.

Although in the embodiments described above with reference to the drawings, the receptacles are screwed into the opening formed by the tubular portion of the hopper, it should be understood that any suitable means of connecting the cartridge to the hopper could be used. For example, the cartridge could be adapted to be pushed or snap fitted into engagement within the opening of the base hopper.

In use, unfiltered water is poured into the compartment of the hopper 11, 11A. That water flows through the mesh covered slots 30, 30A in the screen member 27, 27A and then through the water treatment medium 26, 26A in the receptacle 21, 21A. In the event of a turbulent backflow of water within the receptacle 21, 21A, as water is being poured into the hopper compartment, the seal between the

screen member 27, 27A and the base 13, 13A of the hopper 11, 11A ensures that the water can only move upwards into the hopper compartment through the mesh 31, 31A and thereby prevents particles of the water filter medium 26, 26A moving into that compartment. Once the water has filtered through the water filter medium 26, 26A, it then leaves the cartridge through the mesh 25, 25A at its bottom. The presence of the mesh 25, 25A prevents particles of the water filter medium 26, 26A entering the part of the interior of the vessel below the hopper 11, 11A which thus contains filtered water.

The receptacle 21, 21A and/or the hopper 11, 11A described above may be formed by molding. The meshes 25, 25A, 31, 31A may be incorporated into the receptacle 21, 21A or the screen member 27, 27A during molding thereof in accordance with the teachings of International Application No. PCT/GB97/02120.

An advantage of using a water filter cartridge with a removable cover in accordance with this invention in a hopper fitted with an outlet member, or in a similar installation in a water filter jug, is that the cost of replacement of a water filter cartridge is reduced, as each such cartridge need only be provided with its removable seal and not additionally with a permanent closure or inlet portion.

CLAIMS

1. A water treatment cartridge for use in domestic water treatment apparatus such as a water filter jug, the
5 cartridge comprising a receptacle having an inlet and outlet between which is water treatment medium which is contained within the receptacle, wherein removable covering means are fitted to the receptacle so that the inlet is covered thereby, characterised in that said removable
10 covering means are impervious to moisture and that further removable covering means which are also impervious to moisture are provided so that the outlet is covered thereby, the arrangement being such that the water treatment medium is maintained in a moist condition within
15 the receptacle by the removable covering means and the further removable covering means until the cartridge is required for use in the domestic water treatment apparatus when the removable covering means and the further removable covering means are removed.
- 20 2. A water treatment cartridge according to claim 1, wherein each of the removable covering means and the further removable covering means comprise a removable membrane.
3. A water treatment cartridge according to claim 2,
25 wherein the removable membrane is formed of foil material.
4. A water treatment cartridge according to claim 2, wherein the removable membrane is a plastic film.
5. A water treatment cartridge according to claim 1, wherein the removable covering means and the further
30 removable covering means each comprise a clip-on member.
6. A water treatment cartridge according to any one of claims 1 to 5, wherein the inlet and/or the outlet comprises a plurality of apertures formed in the receptacle, each aperture being sized to inhibit passage
35 therethrough of the water treatment medium which is in particulate form.

7. A water treatment cartridge according to any one of claims 1 to 6, wherein the receptacle is cup-shaped and is provided with means by which it is to be supported within the domestic water treatment apparatus so that it depends from its brim, when the cartridge is being used, the mouth of the cup-shaped receptacle being open and forming the inlet which is covered by the removable covering means until the cartridge is required for use.

8. Domestic water treatment apparatus, in particular a water filter jug, fitted with a water treatment cartridge according to any one of claims 1 to 7, wherein the removable covering means and the further removable covering means of the cartridge have been removed.

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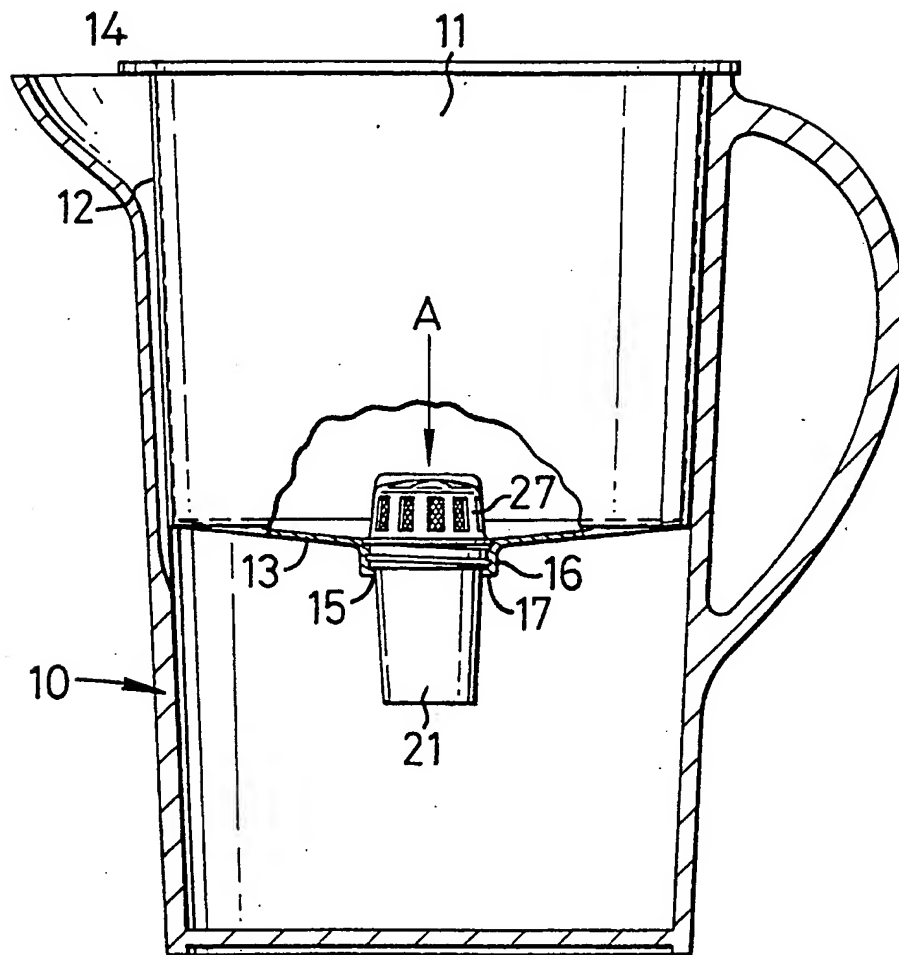


FIG. 1

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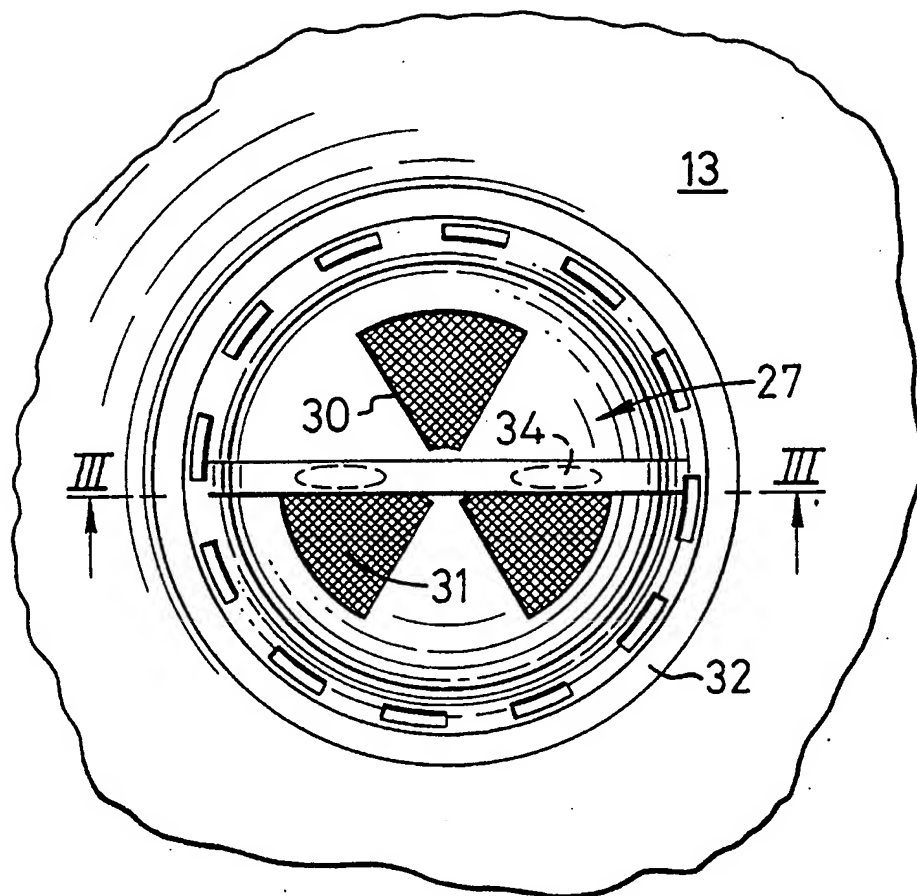
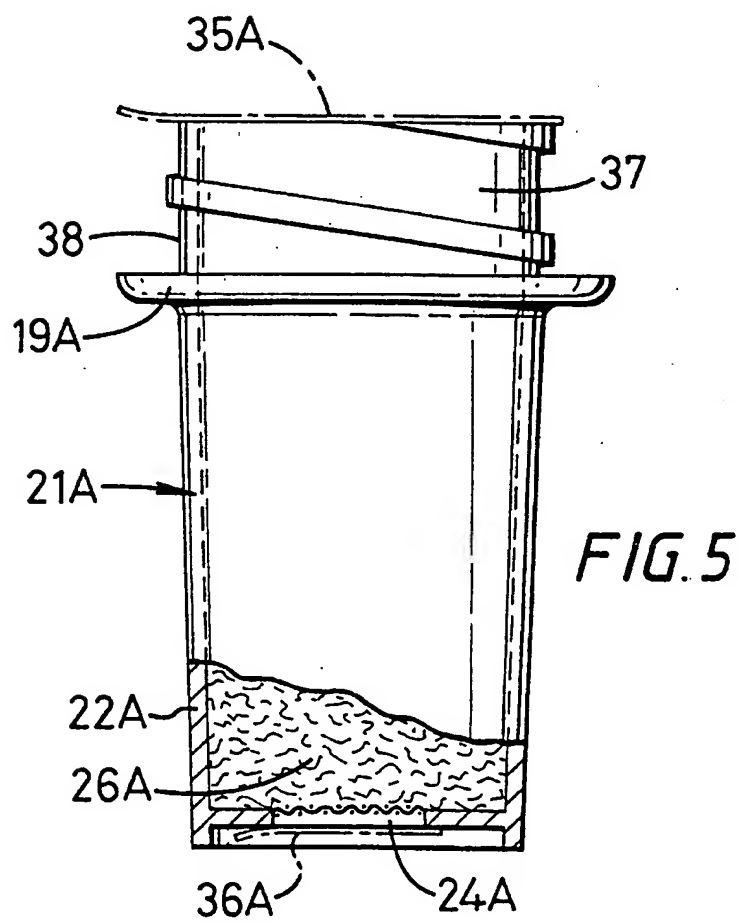
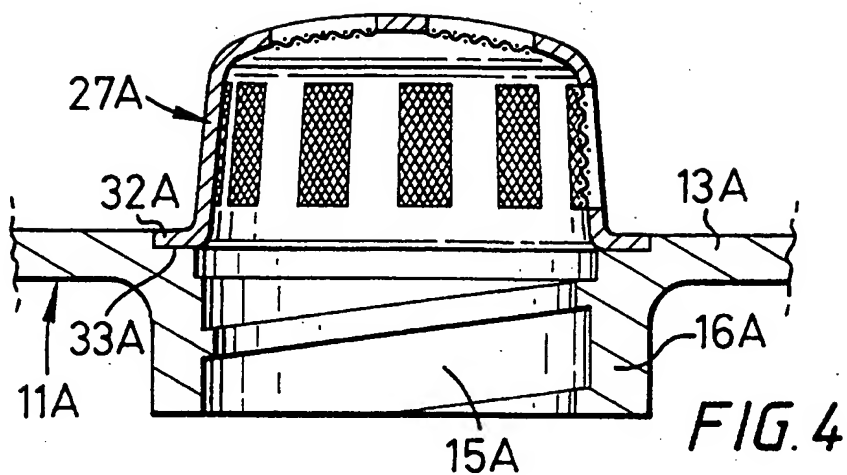


FIG. 2

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 97/02871

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 C02F1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C02F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 285 908 A (LEIFHEIT AG) 12 October 1988 see column 1, line 23 - line 46 see column 2, line 3 - line 39	1,3,6,7
X	US 4 990 449 A (CAISSEL JACQUES) 5 February 1991 see abstract; figure 1	1,2,4,5
X	DATABASE WPI Section Ch, Week 7736 Derwent Publications Ltd., London, GB; Class A97, AN 77-64038y XP002043844 & JP 52 090 460 A (MITSUBISHI RAYON CO LTD), 29 July 1977 see abstract	1-6

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☒ Patent family members are listed in annex.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0285908 A	12-10-88	DE 3712284 A	27-10-88
US 4990449 A	05-02-91	FR 2625071 A	30-06-89
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